

MINERAL RESOURCE POTENTIAL MAP OF THE DEVILS DEN ROADLESS AREA, RUTLAND AND WINDSOR COUNTIES, VERMONT

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- DESCRIPTION OF MAP UNITS
- Pinney Hollow(?) Formation (Early Cambrian and/or Late Proterozoic)**—Quartz-muscovite-paragonite-chloritoid schist locally with abundant disseminated magnetite and chlorite. Thin lenses and laminae of fine-grained quartz are also common
- Hoosac Formation (Early Cambrian and/or Late Proterozoic)**—Coarse-grained quartz-plagioclase-mica schist characterized by albite porphyroblast. CZhd = buff to orange, granular dolomite and dolomite marble
- Informal Subunits of the Mount Holly Complex (Middle Proterozoic)**
(No stratigraphic order implied)
- Ymht** Tourmaline quartzite—Thin- to medium-bedded quartzite and vitreous orthoquartzite containing coarse disseminations, segregations, and layers of black tourmaline
- Ymhg** Felsic gneiss—Layered quartzo-feldspathic gneiss, locally with mica or chlorite. Small, isolated bodies of granite pegmatite are common
- Ymhc** Calc-silicate rock—Coarse-grained rock composed mainly of quartz, diopside, and actinolite
- Ymha** Amphibolite-bearing rocks—Felsic gneiss containing minor interlayered epidote-rich amphibolite and metagabbro(?)
- Ymhq** Quartzitic gneiss—Impure quartzite and feldspathic quartzite, commonly with minor associated muscovite
- Bedding, showing dip**
- Foliation, showing dip**
- Contact, dashed where approximate**
- Fault (approximately located), showing relative movement**
- Thrust fault, dashed where approximate. Saw teeth on upper plate**
- Antiform, showing direction of plunge**
- Overtaken synform, showing direction of plunge**

Studies Related To Wilderness

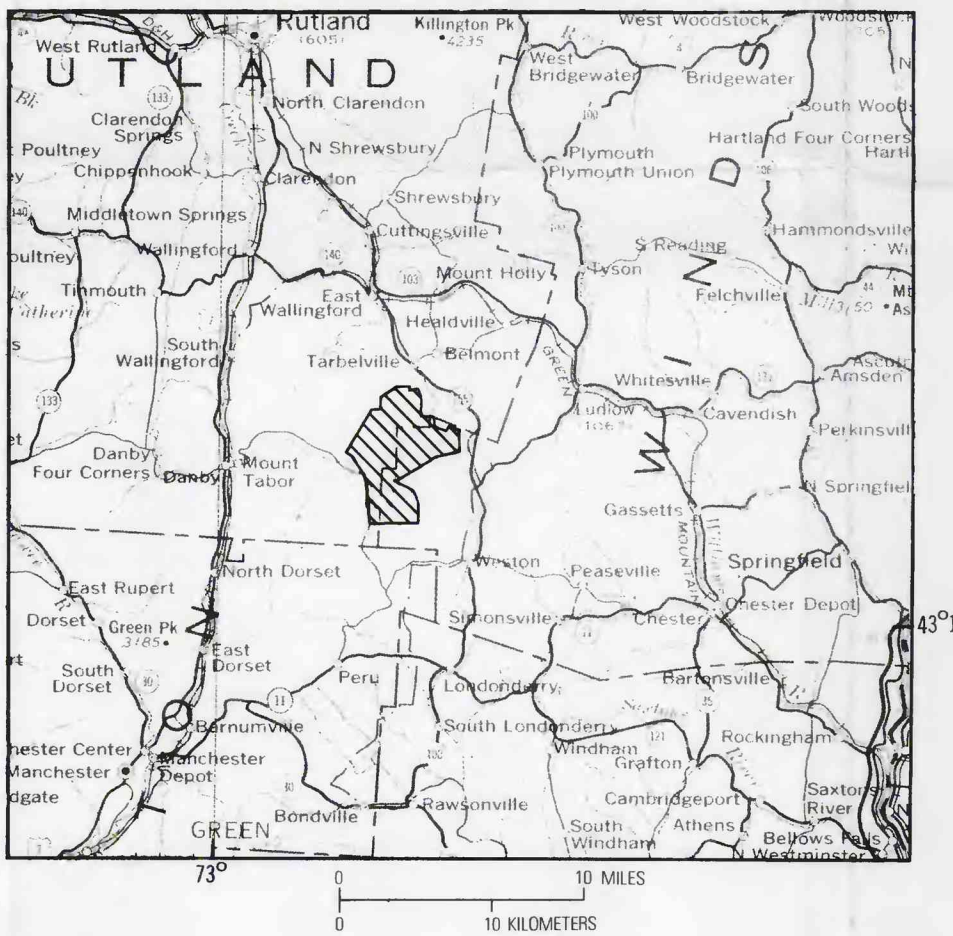
The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral resource potential survey of the Devils Den Roadless Area in the Green Mountain National Forest, Rutland and Windsor Counties, Vermont. Devils Den Roadless Area (09-083) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

The Devils Den Roadless Area, Vt., has no identified mineral resources except for certain non-metallic commodities. The results of a geochemical survey are not indicative of a potential for the occurrence of metallic mineral resources within the study area. Airborne and ground radiometric surveys also failed to locate any bedrock concentrations of uranium or thorium. The only apparent resources in the study area are small deposits of sand and gravel, minor lenses of pure dolomite marble, and abundant rock suitable for construction purposes. Resources of oil or natural gas may exist at depth, but this cannot be evaluated by the present study.

INTRODUCTION

The Devils Den Roadless Area comprises 8,830 acres of mountainous terrane in the Green Mountain National Forest, Rutland and Windsor Counties, Vt. Ludlow, the nearest large community, is approximately 7 air miles northeast of the study area. The small villages of Weston and East Wallingford are 3 and 5 mi to the south and north, respectively (see index map). Total relief is nearly 1,200 ft, from a low elevation of 1,840 ft along the southwestern edge of the area, to a high point of about 2,860 ft in the northwest portion. Principal access is provided by State Routes 100 and 155 on the southeast and northeast, and by Forest Service Road 10 along the western boundary. Old logging roads and foot trails allow entry to the interior of the study area. All surface and mineral rights are owned by the Federal Government.



GEOLOGY

The Devils Den Roadless Area, situated in the core of the Green Mountain anticlinorium, is underlain by metamorphosed rocks of both Precambrian and probable Paleozoic age. Minor glacial and alluvial deposits cover gentle slopes and low elevations. The older Precambrian rocks comprise a basement terrane consisting of diverse lithologies within the Mount Holly Complex of Grenville (approximately 1 b.y. old) age. The Mount Holly Complex is subdivided into several informal units, including felsic gneiss, quartzitic gneiss, amphibolite-bearing gneiss, and minor calc-silicate rock and tourmaline-rich quartzite. Granitic pegmatites are present in the Precambrian gneisses of the Mount Holly Complex, for which they serve as recognition criteria. The younger cover rocks, previously designated the Cavendish Formation during early mapping (Doll and others, 1961), are here separately assigned to the Hoosac and Pinney Hollow(?) Formations of Late Proterozoic and/or Early Cambrian age; rocks possibly

correlative with the Tyson Formation (Doll and others, 1961) are included within the Hoosac Formation. These younger cover rocks include porphyroblastic albite-quartz-mica schist (metagabbro) and minor dolomite of the Hoosac Formation, and quartz-mica-chloritoid-magnetite schist of the Pinney Hollow(?) Formation.

The structure of the area is extremely complicated and reflects a deformational history involving Late Proterozoic and Paleozoic (Ordovician, Devonian) events. The basic structure is interpreted as a doubly-plunging recumbent nappe, broken by several faults. The younger cover rocks crop out near the eastern border of the study area in an upright sequence apparently down-dropped by a normal fault (from the upper limb of the nappe), and in the west and southwest along the lower (inverted) limb of the nappe. The older Grenvillian basement rocks occur in an inverted sequence principally in the core of the nappe, overlying a basal thrust fault; a second thrust is inferred for the easternmost boundary of the area.

All of the rocks of the study area show the effects of regional metamorphism to upper greenschist-facies conditions, in which almandine garnet is common in pelitic schists and dark green hornblende is present in mafic rocks. The abundance of granitic pegmatites in most lithologies of the Mount Holly Complex indicates that the Precambrian basement rocks, extensively retrograded to greenschist assemblages as a result of the Taconic (or Acadian) orogeny, originally underwent prograde metamorphism to sillimanite (or greater) conditions.

GEOCHEMICAL SURVEY

Geochemical analyses of rocks, stream sediments, and panned concentrates do not reveal any significant metal anomalies in the study area. Certain metals have slightly anomalous concentrations, but none are suggestive of important mineralizing processes. Histograms for elements of particular economic interest (Slack, Atlesk, and Grosz, in press) show some enrichment, for rocks as well as for panned concentrate samples. Anomalous values were identified for barium, boron, copper, gold, lead, silver and thorium. Slightly high values obtained for other metals (i.e., chromium, molybdenum, nickel, tin, zinc) are interpreted as normal geochemical distributions, however, and are not considered statistically significant.

MINERAL RESOURCE POTENTIAL

Uranium and Thorium

Geologic and geophysical studies of the Devils Den Roadless Area failed to locate any bedrock uranium deposits. Previously, Morrill and Chaffee (1964) reported a uranium prospect within the study area, approximately 0.75 mi northwest of Devils Den. Recent airborne radiometric surveys (Slack, Buckley, Ayuso, and Raab, in press) indicate that this prospect has a radioactive low, rather than high, signature. Ground checking of this area by USGS personnel yielded only radioactive boulders of clearly glacial origin. The airborne and ground radiometric surveys do not provide evidence of any anomalously high radioactivity in the local bedrock. On this basis, there is no evidence of a potential for uranium or thorium resources in the study area.

Gold

Geochemical analyses of rocks and drainage samples reveal trace amounts of gold in a few materials. Two rock samples from the western part of the study area contain 0.11 and 0.30 ppm gold. Both of these samples are coarse albite schist of the Hoosac Formation. Gold was also detected in three stream sediments, but at concentrations of only 0.05 ppm. Such low gold values are of general interest, but currently are not indicative of a resource potential.

Pegmatite Minerals

Most of the Devils Den area is underlain by the Precambrian Mount Holly Complex, in which local bodies of pegmatite are common. Field studies indicate that these pegmatites are all very small and lack large crystals of mica or feldspar, as well as any rare metals.

Marble

Geologic mapping in the Devils Den area has located three areas of dolomitic marble, two on the extreme east side and the other on the extreme west side of the study area. Most outcrops of the marble are small and only a few yards thick. Common features include a buff to orange color, a fine-grained crystalline nature, and an abundance of small quartz veins; micaceous lenses are also present in some outcrops. A man-made cave developed in the marble outcrop on the western boundary of the study area is the only known evidence of past mining activity (Dale, 1915). Chemical analyses of selected samples indicate that parts of the marble units are essentially pure dolomite (Slack, Buckley, Ayuso, and Raab, in press) and suitable for chemical use. However, the size of the marble bodies and the commonly contained impurities (quartz veins, micaceous zones) indicate that the amount of pure marble is small.

Crushed stone

Much of the rock exposed in and near Devils Den is suitable for road aggregate and for general construction purposes. However, there is abundant accessible rock outside the study area closer to most markets.

Sand and Gravel

A few small deposits of sand and gravel are associated with some of the local drainages, such as at the head of Utley Brook and along the upper tributaries of Greendale Brook. However, outside of the study area, numerous sand and gravel pits are actively worked, including one less than a mile beyond the northeastern boundary, that contain large amounts of sand and gravel.

Oil and gas

Recent seismic studies (Cook and others, 1979; Ando and others, 1982) suggest that the older metamorphosed rocks in the Blue Ridge of the southern Appalachians and the Green Mountains of Vermont overlie a thick sequence of young sedimentary rocks favorable for hydrocarbon accumulations. The Devils Den area is within the so-called Eastern Overthrust Belt which is currently receiving attention by industry. Recently, large tracts of land in central and western Vermont—including parts of Rutland and Windsor Counties—have been leased in the anticipation of a search for oil and gas. A hydrocarbon resource may exist in the strata underlying the study area, but it cannot be evaluated by the present investigation.

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